

# RYAN G KNOX

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## EDUCATION

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**Massachusetts Institute of Technology**

PhD in Hydrology

*February 2013*

**University of Connecticut, Storrs**

B.S.E. in Civil and Environmental & Engineering

*June 2002*

## EXPERIENCE

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**Lawrence Berkeley National Laboratory - Earth Science Division - Climate and Carbon Sciences**

May 2013 - Present

*Postdoctoral Fellow*

Research on the development and implementation of next-generation terrestrial biosphere dynamics and biophysics in land modeling systems.

**Sustainability Science Program at Harvard Kennedy Schools Mossavar-Rahmani Center for Business and Government**

January 2013 - May 2013

*Postdoctoral Researcher*

Research Project: “Sustainable Development of the Amazon and its Surrounding Regions: The Interplay of Changing Climate, Hydrology, and Land Use”. Development of environmental modeling software, pertaining to the physical consistencies of cloud radiation scattering and general handling of model memory.

**Massachusetts Institute of Technology**

*Research Assistant*

September 2004 - October 2012

*Cambridge, MA*

- Thesis research: Knox, R.G. *Land Conversion in Amazonia and Northern South America; Influences on Regional Hydrology and Ecosystem Response*. Dissertation, Massachusetts Institute of Technology. Cambridge, 2012.
- Research experience developing physically based ecosystem and atmospheric models
- Working experience with a wide variety of data-sets related to climate, land-surface energy fluxes and ecosystem structure and composition
- Field experience building eddy covariance (EC) measurement systems (semi-arid and tropical); project design, fabrication of structural elements, system wiring, data acquisition coding
- Research experience in regional rainfall and land-surface statistics, using Tropical Rainfall Measurement Mission (TRMM) precipitation radar and the Terra satellite’s Moderate Resolution Imaging Spectroradiometer (MODIS), see: Knox R.G. et al. *Precipitation Variability over the Forest-to-Nonforest Transition in Southwestern Amazonia*. *Journal of Climate*, 24(9), 2011.

**University of Connecticut**

*Research Assistant*

June 2002 - August 2004

*Storrs, CT*

- Research on uncertainty in radar rainfall estimation and propagation through hydrologic models, see: Knox R.G. and E.M. Anagnostou. *Scale Interactions in Radar Rainfall Estimation Uncertainty*. *Journal of Hydrologic Engineering*, 14(9), 2009.
- Field experience operating an X-band mobile radar

- Field experience managing a network of hydrologic measurement stations
- Technical experience processing raw radar data, delineating watersheds, and operating the Gridded Surface and Subsurface Hydrologic Analysis (GSSHA) modeling framework

## TECHNICAL STRENGTHS

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<b>Co-Developer</b>	Ecosystem Demography Model 2.1 (EDM)
<b>Terrestrial Ecosystem Biophysics</b>	Parametrization of terrestrial heat and mass transfer, integration techniques
<b>High Performance Computing</b>	Parallelization and numerical optimization techniques, vectorization, procedural optimization, input/output, memory handling
<b>Computer Languages</b>	C, Fortran 90, Matlab/Octave, OpenGL, Visual Basic
<b>Protocols &amp; APIs</b>	Message Passing Interface (MPI), Hierarchical Data Format (HDF), Network Common Data Format (NetCDF), OpenMP
<b>Sensor Technology</b>	Campbell data loggers, sensor system design, eddy covariance, heat flux plates, radiation sensors, dielectric soil moisture probes
<b>Visualization Techniques</b>	Designer, Ecosystem Demography Display Interface (EDDI)
<b>Server Administration</b>	Distributed HPC Linux computer clusters
<b>Information Systems Processing</b>	Techniques in: Satellite Retrieval Spectral Correction Geospatial Mosaicing Classification Filtering MODIS,Landsat,SRTM,TRMM,etc

## AWARDS AND AFFILIATIONS

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Member, Chi Epsilon National Civil Engineering Honor Society

Recipient, American Geophysical Union Outstanding Student Paper Award, 2003 Joint Assembly

Recipient, Presidential Fellow, Massachusetts Institute of Technology, 2004-2005

## PUBLICATIONS

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Knox, R. G., Longo, M., Swann, A. L. S., Zhang, K., Levine, N. M., Moorcroft, P. R., and Bras, R. L.: Effects of land-conversion in a biosphereatmosphere model of Northern South America Part 1: Regional differences in hydrometeorology, Hydrol. Earth Syst. Sci. Discuss., 10, 15295-15335, doi:10.5194/hessd-10-15295-2013, 2013.

Knox, R. G., Longo, M., Swann, A. L. S., Zhang, K., Levine, N. M., Moorcroft, P. R., and Bras, R. L.: Effects of land-conversion in a biosphereatmosphere model of Northern South America Part 2: Case studies on the mechanisms of differential hydrometeorology, Hydrol. Earth Syst. Sci. Discuss., 10, 15337-15373, doi:10.5194/hessd-10-15337-2013, 2013.

Kim Y., R.G. Knox, M. Longo, D. Medvigy, L.R. Hutyrá, E.H. Pyle, S.C. Wofsy, R.L. Bras and P.R. Moorcroft. Seasonal carbon dynamics and water fluxes in an Amazon rainforest. Global Change Biology, 18(4), 2012.

Knox, R., G. Bisht, J. Wang, and R.L. Bras. Precipitation Variability Over the Forest to Non-Forest Transition in Southwestern Amazonia. Journal of Climate, 24(9), 2011.

Wang J., R. L. Bras, G. Sivandran and R. G. Knox. A simple method for the estimation of thermal inertia, *Geophysical Research Letters*, 37, L05404, 2010.

Knox, R. and E.N. Anagnostou. Scale Interactions in Radar Rainfall Estimation Uncertainty. *Journal of Hydrologic Engineering*. 14(9), 2009.

Wang, J., F.J.F Chagnon, E.R. Williams, A.K. Betts, N.O. Renno, L.A.T. Machado, G. Bisht, R. Knox, and R.L. Bras, Impact of deforestation in the Amazon basin on cloud climatology, *Proceedings of the National Academy of Sciences*, 106(10), 2009.

Knox, R., F.L. Ogden and T. Dinku. Chapter: Using TRMM to Explore Rainfall Variability in the Upper Rio Chagres Catchment, Panama. Book, *The Rio Chagres, Panama*. R. Harmon (Ed.), Water Science and Technology Library, Springer, 2005.

## CONFERENCE PROCEEDINGS AND PRESENTATIONS

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Knox, R.G., M. Longo, K. Zhang, N.M. Levine, P.R. Moorcroft and R.L. Bras (2011), Regional Eco-hydrologic Sensitivity to Projected Amazonian Land Use Scenarios, Abstract B34F-0360 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.

Bras, R.L., R.G. Knox (presenter), G. Bisht and J. Wang (2010), Patterns of Rainfall over Forested and Deforested Areas of the Amazon Basin, *Eos Trans. AGU*, 91(26), Meet. Am. Suppl., Abstract H33D-01.

Knox, R.G., Y. Kim, M. Longo, D. Medvigy, J. Wang, P.R. Moorcroft and R.L. Bras (2009), Response of South American Ecosystems to Precipitation Variability, *Eos Trans. AGU*, 90(52), Fall Meet. Suppl., Abstract B23B-0370.

Knox, R.G., Y. Kim, M. Longo, J.F. Wang, P.R. Moorcroft and R.L. Bras (2009), Investigating Linkages Between Amazonian Canopy Cover and Local-Regional Climate in the Era of Deforestation, *Tropical Hydrology Symposium*, Panama, March 16-20.

Knox, R.G. M. Longo, Y. Kim, P.R. Moorcroft and R.L. Bras (2008). Hydrometeorology and Feedbacks to Regional Deforestation Scenarios in the Amazon. *Workshop on Amazonian Savannization*. Manaus, Brazil, February.

Knox, R.G., M. Longo, Y. Kim, J. Wang, P.R. Moorcroft and R.L. Bras (2008), Coupling the Ecosystem Demography Model 2 and the Brazilian Regional Atmospheric Modeling System (ED2-BRAMS) to Simulate the Seasonal Hydrometeorology in Amazonia, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract GC43A-0722.

Knox, R.G., R.L. Bras, J. Wang and G. Bisht (2008). An Analysis of Cloud Patterns over Deforested Amazonia Using TRMM Observations. *The 3rd TRMM International Science Conference*, Las Vegas NV, February 4-8.